Explorations in BC ,
Chiefly in the Basins of the
Blackwater, Salmon, and Nechacco
Rivers, and on Francois Lake.

By George Dawson

REPORT

ON

EXPLORATIONS IN BRITISH COLUMBIA,

Chiefly in the Basins of the Blackwater, Salmon, and Nechacco Rivers, and on François Lake,

BY

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ADDRESSED TO

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Regions examined during the season.

In April last, as soon as the weather permitted, regular field work was begun by the preliminary examination of the country in the vicinity of Leech River, Vancouver Island. A short visit, for which opportunity offered, was then made to Bute Inlet, and on the 19th of May I left Victoria for the interior of British Columbia, where the greater part of the summer was spent. The routes followed, and particular localities examined are described in the following pages. In conformity with instructions received, attention was devoted to the area between the Fraser River and the Coast Range, to the east and west, the Bella Coola Valley, and François Lake, to the south and north. In this country various lines were in course of examination as possible railway routes, and it also formed a natural extension of that in which the reconnoissance work of the summer of 1875 was carried on.

Short excursions were made late in the autumn to the Cariboo region and to the Nicola Coal Basin. Some results of these, with other details of purely economic interest, have been published as *Appendix R* in the lately issued General Report on the Canadian Pacific Railway Surveys, and appear again in a revised form in connection with the present report.

Acknowledgments.

Acknowledgments are due to the gentlemen engaged on the Canadian

Pacific Railway Survey, for their uniform courtesy in furnishing transport, supplies, &c., even in cases where doing so might have entailed some inconvenience to themselves. During the season's work on the mainland, I was ably assisted by Mr. Amos Bowman, to whom my thanks are due, as well as to Professor Macoun and Dr. G. Engelmann, who have since aided in determining some of the botanical specimens collected.

With the exception of incidental references in connection with the general description of the country, the superficial geology, including the history of the glacial period and its deposits, is not treated of in this report, the time at present at command being insufficient for that purpose.

True bearings.

The bearings given throughout this report are with reference to the true meridian.

Spelling of Indian names.

(In the Indian names of places, where a conventional mode of spelling has not become too firmly fixed by long usage or previous publication, the orthography of the Smithsonian Standard Vocabulary has been followed as closely as possible without the use of special type; *oo*, however, being sounded as in "pool." The words thus spelt according to pronunciation are divided into syllables by hyphens.)

General Description of Country, and Routes Travelled.

Vegetation at Quesnel.

From Quesnel to Blackwater Bridge.—In approaching Quesnel from the south, many of the plants of the dry regions of the interior plateau disappear, and are replaced by others suited to a moister climate. In conjunction with this, it is found that grain may be grown without irrigation at this place, and northward. On the 28th and 29th of May of last year, the service-berry (*Amelanchier Canadensis*), the high bush cranberry (*Viburnum pauciflorum*), and wood violet (*Viola Canadensis*) were found in full flower. The wild strawberry (*Fragaria Virginiana*) still showed many blossoms; and the floral bracts of the pigeon-berry (*Cornus Canadensis*) were beginning to whiten. The berries of *Shepherdia Canadensis* were formed, though small.

Benches.

On leaving the river bank opposite Quesnel, the trail gradually ascends over broken ground, due to former slides affecting the edges of the terraces with which the river valley is fringed. The two best marked of these are elevated 150 and 560 feet respectively above the flood level of the Fraser; the last named again appears at an elevation of 100 feet above the stream called West River, ten miles from Quesnel. The

Plateau between Quesnel and Blackwater.

general level of the plateau is here about 850 feet above the Fraser, or 2,550 feet above the sea. On its surface terrace-flats cease to appear, and are replaced by low rolling hills and hillocks, formed of boulder clay, here a hard, partly arenaceous material of pale fawn colour, charged with rolled pebbles and boulders of very various origin, but for the most part of rocks which may be attributed to the Lower Cache Creek series. Basalt is not seen in place on the part of the plateau over which the trail passes, but in boulders is pretty abundant where the plateau-level is first reached, on leaving the Fraser Valley. In some places the low drift hills show a very general tendency to north and south arrangement of their longer axes, and in one locality a small rocky hill, projecting through the thick drift covering, was seen with a fan-shaped mound of detrital matter on its south side. A range of low hills rising above the plateau to the south-west of the trail, appears to run with a general course of N. 55° W. The summits may stand 500 feet above the general level. On reaching Goose or Herkyelthtie Lake,—half way from Quesnel to Blackwater Bridge,—this range breaks down, and an irregularly hilly and rolling country stretches westward. The lake is about 1,050 feet above the Fraser. Beyond Goose Lake a rather extensive gently undulating terrace-plateau, with an average elevation of 1,012 feet above Quesnel, or 2,706* above the sea, was noted. The material of this plateau and that covering the surface of the country generally is boulder clay of the type above described, which, though implying water deposit, is in some places so much broken into mounds and ridges as to suggest moraines. In a few miles the range to the west again becomes pretty well defined, and with the same height as at first, runs parallel with the trail at an average distance of about three miles, but separated from it by a broad valley which holds a chain of small lakes, with wide swampy meadows. From the northern brink of the Blackwater Valley a very extensive view is gained, showing the north-western continuation of this,—the Telegraph Range,—and the lower country toward Fort George.

Effect of forest fires.

Fires have passed extensively and often over the country between Quesnel and Blackwater, destroying the original thick growth of western scrub pine (*P. contorta*), and Douglas fir (*Abies Douglasii*), and in some places, over considerable areas, almost completely removing the windfall. Small alders, aspens and scattered scrub-pines come up on these burnt areas, with grass which, though sometimes wiry and "sour," is often of good quality and mixed with wild pea and vetch. It is evident

* The height of the flat on which Quesnel is built being, by a simultaneous series of barometer observations there, and on an instrumentally levelled line 1,694 feet.

that the destruction of the forest has led to the desiccation of the soil, some places which it had been necessary to corduruoy when the trail was originally made, being now quite hard. The vegetation on the plateau is appreciably behind that at Quesnel, the difference being most apparent when elevations above 2,000 feet are reached. The only land fit for cultivation is within a few miles of Quesnel, and that lying beyond the immediate valley of the Fraser is very limited in area.

Height of Blackwater River.

The valley of the Blackwater near the bridge, with its wonderfully terraced sides, has been described in a former report (1875–76, p. 244.) The height of the river itself above the sea, brought down by barometer from the nearest bench-mark on Mr. Bell's location line of 1875, is 2,170 feet.

Bella Coola Trail.

Blackwater Bridge to Eu-chen-i-ko River, &c.—On the northern brink of the Blackwater Valley, the so-called Bella Coola Trail leaves the well-beaten Telegraph Trail, and following the Blackwater River and its tributaries till those of the Salmon River are reached, leads eventually to the Salmon House near the head of Dean Channel, and the Indian villages on the Bella Coola River, discharging into Bentinck Arm. This trail appears, from the markings on the trees and other circumstances, to be a very old one, and indeed, we know from Sir A. Mackenzie's narrative of his journey to the Pacific Ocean, that it was in constant use at the time of his visit (1793). He speaks of it as a well-beaten path, and it has probably been for a long time one of the great trading roads between the coast and inland tribes. Like all the other Indian trails in the northern part of British Columbia, since the great reduction of the Indian population by small pox, it has become in many places much encumbered with windfall.

Eu-chen-i-ko and Na-tan-i-ko.

Five miles from Blackwater Bridge, the trail leaves the river bank, and continuing westward, crosses the Telegraph Range north of the Upper Cañon, and at about twenty miles from the Bridge reaches the Na-tan-i-ko and Is-cul-taes-li or Eu-chen-i-ko Rivers near their junction, four miles from the Blackwater, which here bends far to the south. This part of the route has been already described in my report for 1875.

From the western slope of the Telegraph Range, an extensive view is obtained up the low valley of the Eu-chen-i-ko, and a belt of low country, which, I believe, extends north-westward to the Nechacco. About the junction of these two streams a wide sandy flat occurs, with an average elevation of about 2,750 feet. The Eu-chen-i-ko, when in flood, is a stream about sixty feet wide, and where rapid can not be forded; the Na-tan-i-ko may carry about one-third as much water. These streams do not

depend for their supply on melting snow, and consequently, even when full, are clear, though the water has a brownish tint. They rise early in the season, and like all the streams supplied by swamps and lakes, fall to their summer level, while those with sources in the mountains are still carrying their maximum amount of water. The Eu-chen-i-ko Valley holds many small lakes and lake-like expansions, some of which open into the river or form a part of its course, while others are steep-sided and separated from the stream by flat-topped mounds. Three large lakes occur as expansions of the river in the part of its length which has been explored. The first I have not seen; the second, Tas-un-tlat, eighteen miles up the river from its junction with the Blackwater, is about six miles in length, with an elevation of about 2,970 feet, and holds many long islands produced by gravel ridges like those above mentioned, but not distinctly flat-topped. The ridges in both cases appear probably to be moraines, but at the lower levels must have been somewhat modified by nearly contemporaneous water action. Five miles beyond Tas-un-tlat is Klun-chat-is-tli Lake, a mile and three-quarters long, with an elevation of 3,070 feet. Near the west end of this lake, Tai-uk Brook joins the Eu-chen-i-ko from the south-west; a stream, which on the sixth of June, with a very rapid current, had a width of about ten feet, with a depth of twelve inches. This stream we were obliged to follow in our exploration, the river valley continuing with much the same aspect that it had heretofore presented, with a general bearing of N. 42° W. The Indians described to me as existing in the valley, at the distance of about a day's journey beyond this point, some remarkably coloured rocks, from which steam or smoke ascends in winter. This may very probably be a case of the spontaneous combustion of a lignite bed, like that described in the Report for 1875 as occurring at Quesnel.

Lakes on Eu-chen-i-ko.

Probable existence of lignite.

The portion of the Eu-chen-i-ko Valley followed, has a general course of N. 65° W. To the north it is bounded by rising and hilly ground, forming part of, or flanking the Telegraph Range. Hills appear on its southern side within a few miles of its junction with the Na-tan-i-ko, and continue to increase in height and width north-westward. In some places they may rise from 1,000 to 1,500 feet above the river. The valley is wide and flat-bottomed, and while its southern side is thickly timbered, except in certain spots where fires have run, the northern, with a considerable portion of the flat ground along the river, is generally open, and presents a very attractive appearance, being covered with bunch-grass, with patches of wild onions and occasional tufts of sage (*Arte-*

Character of Eu-chen-i-ko Valley.

misia frigida.) There is little arable land in the valley, but a considerable area fitted for stock ranges. On the 5th of June the young grass was showing well above the dead tops of the old, while small patches which had been burnt over were vivid green. An Indian who is in the habit of wintering a few horses here, cuts a stack of hay for their use in the autumn, and does not trouble himself further about them till the spring.

Vegetation.

Where sandy beaches occur, the scrub pine invariably forms groves, in which many of the trees were here observed to be dead and dying from the effect of the parasitic *Arcuthobium*, which hangs upon them in masses. The river is generally fringed with dark groves of tall symmetrical black spruces (*Abies Englemanni*), while small poplars characterize the slopes. This valley may be taken as a type of many which intersect the northern part of the interior plateau, of which most are probably yet unknown, but which must in the aggregate represent a great area capable of feeding cattle and horses. On ascending to the higher plateaus or low hills bordering the valley, the surface is found to be composed of the boulder clay, generally stony, and either covered with thick forests of the scrub pine, with windfall, or the young growth succeeding fires. Where the timber has been pretty thoroughly burnt over, by the passage of a fire, killing the original forest, followed by the uprooting of the dead trees by wind, and then by one or more subsequent fires among the prostrate timber, fair grazing is frequently found, and in many places grass, with pea, vetch and other nutritious plants come up in great abundance.

Tai-uk stream.

Following the Tai-uk stream for eight miles, its source is found in Choo-tan-li Lake, at an elevation of 3,600 feet. The valley of the stream is narrow, and slopes upward more rapidly than the general surface of the country gains in elevation, so that on reaching the lake one appears to be at about the level of the plateau. The Kuy-a-Kuz Mountains, rising to the west, showed large patches of snow on their summits at this date (June 7th).

It is on the north-western continuation of this range that Fawnie or Toot-i-ai Mountain is developed.

Terraces.

Terraces are well displayed in the Eu-chen-i-ko Valley, at heights estimated near Tas-un-tlat Lake at forty, 100, and 250 feet above the stream. The highest of these would have an elevation of about 3,280 feet above the sea. Near the Tai-uk stream terraces 3,400 to 3,500 feet above the sea are found.

In travelling from Choo-tan-li Lake southward to the Blackwater River, a part of the very obscure and almost disused Indian trail, from

Country between Choo-tan-li and Blackwater.

To-tuk Lake towards Cluscus was followed. The country passed over is a succession of ridges, running more or less regularly in east and west bearings, separated by hollows with swamps and lakes. Their elevation varies from 4,200 to about 4,500 feet, and their northern slopes are densely covered with forests of tall straight black spruce, mingled with balsam spruce (*Abies lesiocarpa*) resting on a peaty and mossy soil, on which patches of snow were found lying in the deep shade of the trees on the seventh of June. The southern slopes are more openly wooded, but here tangled and almost impenetrable windfalls occur. On this high country the rock is seldom seen, there being apparently a great thickness of drift. Very large boulders are scattered over the surface in many places.

The Blackwater Valley.

Valley of the Blackwater north of the Cluscus Lakes.—This part of the Blackwater Valley, like most of its length between this place and the bridge at the Lower Cañon, has much resemblance to that of the Eu-chen-i-ko above described, but is on a larger scale. The north slope is generally bare, or but lightly tree-clad, with bunch-grass, wild onions, bearberry, vetch, strawberry and *Galium boreale*, while thickets of willows and dwarf-birch (*Betula glandulosa*) fringe the stream. The south bank presents a somewhat similar assemblage of plants, but is much more thickly timbered, with scrub pine and poplar, and occasional groves of black spruce. The appearance of the river valley is pleasing, and there is abundance of good grazing for animals, which the winter snows can not be deep enough entirely to cover, as the Indians of Cluscus Lake own a number of horses which are allowed to live as best they can at all seasons. The sloping sides of the valley are generally steep, but show little rock, being covered with terraced drift material. At this place, a very conspicuous bench may be traced, running for miles along the valley at an elevation (at Cush-ya, sometimes called Upper Euchinico Lake) of 296 feet above the river, or 3,476 feet above the sea. The river itself flows rather rapidly between the long lake-like expansions, which here characterize it, and add greatly to the beauty of the landscape. Whether these lakes are held in by rocky barriers or dammed merely by drift material, I have been unable to satisfy myself.

Waterfall.

About one mile above Cush-ya Lake, the whole volume of the river descends at a leap about fifteen feet over a bed of grey columnar basalt. The waterfall is symmetrical and curtain-like, with dark amber-coloured water.

Kuy-a-Kuz Lake.

Two miles north of Cush-ya Lake, at an elevation, according to the railway maps, of 500 feet above it, is Kuy-a-kuz Lake, lying nearly east

Remarkable position of watershed.

and west, like the Blackwater Valley, but discharging its waters northward into the Nechacco. It is remarkable, that with the exception of the Eu-chen-i-ko—which flows in a nearly parallel valley—the Blackwater receives no important tributaries from the north, the surface of the plateau seeming, on the whole, to slope northward from the brink of its valley. This is specially noticeable in the lower part of its course, where streams eventually joining the Chilacco may be found almost within gunshot of its northern edge. The northern and north-eastern side of Kuy-a-kuz Lake is bounded by the mountains of the Kuy-a-kuz Range, while the gently rolling plateau with sandy and stony soil, which separates it from the Blackwater, has an average altitude of about 3,700 feet.

Blackwater Crossing.

Country in the vicinity of the Trail and Location Line, westward by the Cluscus Lakes and Salmon River Valley to the Iltasyouco River.—The Blackwater is crossed at several places by the Indians when on the way to Cluscus Lakes, but of these the best known is at the junction of the Cluscus stream. At high water the river can only be crossed in this vicinity by rafting, but this is easily effected. The Cluscus stream was estimated on June 15th to have a width of twenty feet by two feet in depth and slope of about one in ten. Its water had a temperature of 61·5°, that of the Blackwater being 53·5°. The trail follows the stream southward for about half-a-mile, and then turns west-

Cluscus Lakes.

ward along the northern border of the lakes. The lower lake has an estimated total length of about six miles, with a width of less than half-a-mile at its upper end, and quite narrow and river-like at its lower. It is separated by a stream of about a mile and a-half in length from the upper lake, which, with a length of scarcely three miles, has a width of about three-quarters of a mile at its upper end, and holds two small islands. The water feeding these lakes must enter the upper on its southern side, and from its high temperature, is probably derived from other shallow lakes or extensive swamps. The country along the north side of the first lake is of very pleasing appearance, sloping gently with an undulating surface to the water, and dotted with groves of aspen and spruce, where not covered with luxuriant grass. The northern slope of the upper lake is similar but steeper, and showing a smaller area of grazing land. The lower lake stands about forty feet higher

Terraces.

than the Blackwater River. A terrace, estimated at 100 feet to 120 feet above it is visible, and a second near its lower end, at an elevation of about 300 feet. The valley which contains the lake is seen to continue eastward beyond its outflow. At the west end of the first lake an Indian house is situated, and this has for a long time been

a rendezvous for the natives, the site of an old establishment of the Hudson Bay Company being visible near at hand. The trail now described was that followed by Sir Alexander Mackenzie when on his way to the sea, the name obtained by him for the natives of the locality being *Sloua-cuss-Dinais*. There were at the time of his visit two houses at the upper end of the first lake, which, as he says,* "occupied a most delightful situation."

Upper part of Blackwater River.

On leaving the upper end of the second lake the country is found to change for the worse. Broken fragments of basalt strew the surface in many places, and dry sandy and stony soil alternates with swamps. In three miles, the Cush-ya River of the maps (Tsan-tsed-a-ko of the Indians) is reached. On June 16th it was estimated to average fifteen feet in width by two feet deep, with a swift current. To the south, at a short distance, the northern front of the basaltic plateau appears as a low broken cliff of columnar basalt; it runs south-westward for some distance from this point, and was noted by Sir A. Mackenzie as a "high, rocky ridge" † stretching along on the left. The country traversed by the trail from this place to the Third Crossing of the Blackwater, may, in fact, be considered as a region forming the broken and more or less denuded border intervening between the northern edge of the volcanic plateau and the Blackwater River. Older rocks are, however, seen at the surface in a few places. The trail follows, for about three miles, the south shore of Tsa-cha‡ Lake, crossing three streams. The first and largest of these had an estimated volume of ten feet by two feet, with a slope of about one in ten. Here the old C. P. R. Survey trail to Chizicut Lake turns off, and about a mile up the stream rocks of the Tertiary lignite formation are seen below the basalts, though without any visible lignite coal. The north side of Tsa-cha Lake, which is one of the expansions in the Blackwater River, is partly open and grassed, with light groves of poplar, spruce and pine, rising at a short distance into broken rocky hills.

Lakes.

Eight miles further on is Tse-tzi Lake, nearly a mile long, and with low basaltic cliffs on its south-eastern side; and a short distance further on Klootch-oot-a Lake, nearly a mile and a-half long, and discharging into the former, is reached. Between the two lakes, the Indian trail to Bella Coola or Bentinck Arm turns off, and will subsequently be noticed. Here again are a few Indian houses, and some swampy meadows of considerable

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* "Voyages from Montreal on the River St. Laurence, through the Continent of America, to the Frozen and Pacific Oceans." London: 1801. Page 298.

† Op. cit., page 300.

‡ The name meaning great stone, or mountain, and referring to the rocky hill on its north bank, is changed to Thracha on some maps.

size. About a mile beyond the last named lake, Tsil-be-kuz Lake, (Kultus Coolie of the maps) is approached at its east end. It discharges westward into the Blackwater, which here makes a hook-shaped bend, enclosing this and the two other lakes before referred to. At its third crossing, north of Tsil-be-kuz Lake, the Blackwater, instead of flowing in a deep valley as before, is found nearly at the general level of the plateau, and though easily fordable in the middle of summer, was a rapid and difficult stream to raft and swim horses across in June.

Ancient volcanic mountains.

From the north bank a good view is obtained of a snowy range of mountains, of which the higher parts are included between S. 37·5° W. and S. 5° W. The surface of the country slopes up gradually towards its base, while the higher portions are more or less covered with snow on the shady exposures the whole summer. The peaks probably attain an elevation of 7,000 feet above the sea, or almost 3,500 feet above the point of view. This is the central of three isolated snowy ranges which lie east of the Coast Mountains, between the main valleys of the Blackwater and Salmon River to the north, and that of the Bella Coola and its tributaries to the south. It is called Il-ga-chuz by the Indians, while that lying between it and the Coast Ranges is known as Tsi-tsutl, and that to the east is named It-cha. Between Il-ga-chuz and Tsi-tsutl, a remarkable isolated mountain called Beece, or Anahim's Peak, is situated, and stands on the west side of the southern part of the Salmon River. These mountains were at first supposed, from their appearance, to be formed of beds like those of the vicinity of Tatlayoco Lake, tilted at low angles on the flanks of metamorphic rocks. They were, however, subsequently found to consist entirely of volcanic materials, and to mark the sites of three great vents, from which in Tertiary times a large part of the basalt which has flooded all this region, must have been derived.

Eliguck or Uhl-ghak Lake.

In continuing westward for about ten and a-half miles, the valley of the Uhl-gha-ko, an important tributary of the Blackwater, is followed, and Eliguck Lake (more correctly Uhl-ghak) is reached. The country is flat, or gently rolling, with sandy or stony soil more or less densely timbered with small pines, and, with the exception of a few spots of limited extent, not even affording grazing for animals. Where it issues from the lake, the brook was estimated to have a width of fifteen feet, with a depth of two feet, and a sluggish current. At the lake is a meadow of fine grass, with an Indian house belonging to a man of some consequence called Smi-you, and a few Indian graves. This I believe to be the place described on page 304 of Mackenzie's narrative. Uhl-ghak

Lake is about three miles in length, and has a rather prominent rocky hill on its north bank.

Gatcho Lake.

About sixteen miles west-south-west of Uhl-ghak, the Salmon River is first reached, the head-waters of the south-western sources of the Nechacco being crossed in the intervening region. The country between Uhl-ghak and Gatcho (more correctly Ilgatcheo) Lakes is broken and hilly, though with no elevations of great height, the higher parts of the surface being remnants of basaltic and other rocks of the volcanic plateau, while older beds appear in the lower ground. The surface of the uplands is stony, dry and barren, alternating with mossy swamps, in which *Abies Engelmanni* sometimes attains a diameter of three feet, with dense forests of the western scrub pine, growing to a great height, and reaching in many places a diameter of over eighteen inches. At Gatcho Lake is another Indian house and some graves, the house being the best built of any I have seen in the interior, and, though repaired for a great *potlatch* this summer, bearing marks of very considerable antiquity. I have little doubt that this is the house mentioned by Mackenzie on p. 307, and that the "river" he crossed (p. 308) was the Gatcho Lake stream, which flows to the Nechacco.

Indian house.

Between Gatcho Lake and the Salmon River the aspect of the country is very similar, but in some places, where the dense forest of scrub pine had been partly destroyed by fire, a rank growth of fine grass was noticed. Some of the swamps are grassy, though most are covered with moss and thickets of willows and dwarf birch.

Salmon River.

Where the Salmon River is first seen, the Indian trail to the Salmon House, and Bella Coola River crosses it, while a new trail made to accompany the Railway Location Line continues down the stream on its north bank. The former will be subsequently described.

Moraines.

The Salmon River is here a stream with only a moderately rapid current, and not much depressed below the general level of the plateau, the surface sloping down gently towards it. There are many moraine ridges and mounds, some nearly parallel—while others are nearly transverse to the direction of the valley, causing a multiplicity of small pools and swamps. For more than ten miles down the north bank of the river, from this point, the woods have been almost entirely killed by fire, but have not yet fallen. When a gale of wind visits this region it will cause an almost impassable wind-fall. There are a few pretty meadows of limited size along the river, and in some places many tall aspens were observed growing among the coniferous trees, a sign of good soil and more congenial climate. The flowering plants were also noticed to be

Vegetation.

considerably in advance of any seen lately. *Aquilegia Canadensis* and *Cornus Canadensis* were in full flower on June 23rd, while the lupin (*Lupinus Nootkatensis*) also appeared for the first time, and *Thalictrum dioicum* and *Smilacina stellata* were common on grassy banks.

Further down the Salmon River, with continued evidence of greater rain-fall, the forest is found unburnt, and consisting in great part of the scrub pine in tall dark groves. One or two small patches of snow were observed in the densely shady parts of the woods. A corresponding change takes place in the undergrowth, *Lycopodium complanatum* becoming abundant, while the beautiful *Calypso borealis* covers large patches of the mossy soil, and *Viola sarmentosa* and *Pachystima myrsinites* appear.

Salmon River Fall.

About six miles above the mouth of the Iltasyouco River (known to the Indians as the Pun-chi-as-ko), the Salmon River makes its first great leap, in a fall about eighty feet in height, descending by several steps. The water does not pause at the foot of the fall, but continues onward as a foaming rapid as far as it can be seen, and here leaving the general level of the plateau enters its cañon, and in a distance of forty-five miles reaches the sea after accomplishing a descent of nearly 3,000 feet. The

Iltasyouco River.

Iltasyouco River falling into the Salmon River from the north, is about seven miles in length between its exit from Si-gut-lat or Tse-houts Lake, and junction with the Salmon River. The bluish colour of its water contrasts with the amber tint of the Salmon River. In June it appeared to carry from one-half to two-thirds as much water as the latter. The river valley is at least 300 feet below the average elevation of the country, and is trough-shaped, with a wide rounded bottom. There are low terraces at several levels near the stream, and one,—best marked near Si-gut-lat Lake—at an elevation of about 200 feet above it, consisting of rolled gravel and sand. The river itself, though often bounded on one side or other by steep banks, can never be said to flow through a cañon. A mile above its mouth, it forms a very picturesque waterfall, over rocks of the mesozoic volcanic series, which characterize this valley. The first leap of the fall is made in a broad curtain-like sheet of water, over the edges of hard bluish feldspathic rock, which dips in a direction opposite to that of the stream. After this descent of about twenty-five feet, the water boils and foams in a wide rocky basin, till jostled together by the narrowing rocks into the throat of a very narrow chasm, it falls a similar height between perpendicular rocky walls, a mass of seething foam.

Appearance of coast plants.

A considerable change in the character of the vegetation is noticed in this valley. The forest is of a more mixed character, pines and spruces

being commingled with occasional aspens. The balsam spruce (*Abies lesiocarpa*) appears abundantly, while the scrub pine attains a greater size than it has elsewhere been observed to do, and *Abies Engelmanni* often surpasses three feet in diameter, and reaches a great height. Another species of pine (*Pinus albicaulis*,) was noticed, though rarely. The hemlock (*Abies Mertensiana*) appears, and at the fall shrubby representatives of the giant cedar (*Thuja gigantea*). Among the plants constituting the undergrowth, the elder (*Sambucus pubens*) and devil's club (*Echinopanax horrida*) were new features, the whole probably indicating not so much a milder as a damper climate.

From Salmon River Crossing to the Salmon House, northern edge of Bella Coola Valley and Na-coont-loon.—Returning now to the Indian crossing of the Salmon River, mentioned on a former page, I shall describe the country from that place to the Salmon House, and next that southward to the Bella Coola Valley.

Scanty Indian population.

On arriving at the crossing place on July 7th, we found all the Indians of this part of the country collected there, on their way down to their annual fishery at the Salmon House. They may have been from fifty to sixty in number, this representing the population of a tract extending beyond Lake Tschich northward, and nearly to Cluscus Lakes eastward; or about 2,500 square miles of surface. Here I parted from Mr. Cambie, who continued eastward on his way to Quesnel, my own party now consisting, besides myself, of A. Bowman, assistant, one Mexican packer, and one Lillooet Indian packer and cook. Some of the Indians were engaged to assist in building a raft, which was speedily accomplished, and before dark our camp equipage and provisions were ferried over, the animals crossing a short distance below in a small rapid, without losing bottom. The Indians were not slow to take advantage of the raft which they had been paid to make, and following us to the south bank, made their camp much closer to ours than might have been wished.

Cross Salmon River.

July 8.—Travel by the trail south-westward to Tanyabunkut Lake (more correctly Tai-a-taisli-bun-kut). Heavy rain in the afternoon and bad trail, the mules miring down several times, and there being two bridges to repair before they could be crossed. Passed the Indians on the march, every man, woman and child, and even the dogs, with packs of appropriate size. All appear to be in good spirits, and on the way to their great annual holiday-making, the Salmon fishery, the whole scene much resembling that described by Sir A. Mackenzie, who travelled part of this very road with the Indians on the way to their fishery, on the 15th July, 1793.

Character of the country.

The country passed over to-day is stony and barren, and the greater part of the woods have been removed by fire. The first few miles after leaving Salmon River Crossing, are over rocks of the basaltic series, but near Hatty Lake of the map, the surface becomes broken, resembling the country in the angle between the Iltasyouco and Salmon Rivers, and is, like it, based on older rocks. There are, however, occasional broad swampy meadows, affording good feed for animals, but unfit for agriculture. Near the north end of Tanyabunkut gravelly moraines are passed over, and its south-eastern side is bordered for a short distance by very high basaltic columns.

Vegetation on burnt ground.

The greatly more advanced state of the vegetation where the country has been cleared by fire, is quite remarkable. The following plants were noticed in open ground to-day:—*Lonicera involucrata*, in flower; *Pyrola rotundifolia*, showing colour; *Fragaria Virginiana*, still in flower, and *Anemone multifida*, *Rubus arcticus*, and *Castilleia pallida*, in flower; *Achillea millefolium*, beginning to flower; *Linnæa borealis*, in bud; *Ledum latifolium*, flowering in warm situations; *Sedum* ——? in flower; *Epilobium angustifolium*, not yet in flower.

Tanyabunkut Lake.

July 9.—Morning fine; thunder storms with heavy rain in the afternoon. Waited to take some photographs of the lakes and mountains, and then travelled on down the north-west side of the lake, camping about five miles beyond its lower end. Tanyabunkut Lake is about five miles long, narrow, and with steep rocky banks, composed of Tertiary volcanic materials, which are cut into by the valley. At its lower end the valley widens, a high basaltic cliff bounding it to the north.

July 10.—Followed the trail south-westward about seven miles, making in the last mile a descent of several hundred feet. The trail runs midway between the Salmon River on the right, and the Tai-a-taesli on the left, the latter stream draining Tanyabunkut Lake, described yesterday.

Moraines.

The first part of the path is over moraine mounds and ridges, which, though at first almost entirely composed of granite blocks, soon showed a preponderance of dioritic, and greyish or greenish porphyritic rocks, like those of the older volcanic series. After making the descent above referred to, we found a small pond and grassy meadow. Not wishing to take the heavy packs further, they were here left with the pack mules in charge of the Indian, Johnny. Riding on for three and a-half miles, by a very blind trail, much blocked by recent windfall, we suddenly

The Salmon House.

emerged on the open brow of a hill, from which the Salmon House, and a considerable length of the Salmon River Valley, were visible. The valley of the Tahyesco River,—of which the Tai-a-taesli is a branch

PHOTO. LITH. BY THE BUNLAND DESBARATS CO. MONTREAL.

BASALTIC SLOPES OF TSI-TSUTL RANGE.

LOOKING DOWN TANYABUNKUT LAKE.

From Photo. July 9th, 1876.

CHIL-A-THLUM-DINKY, COAST RANGE.

—here enters the Salmon River from the east, an area of comparatively low ground, in shape nearly an equilateral triangle, lying at the junction of the streams. The apex of the triangle, pointing down stream, is occupied by a little rocky hill, while the remainder, elevated about 100 feet above Salmon River, is a gravelly flat, descending by several rough steps on the Tahyesco side. Making the descent of about 500 feet by a very steep and critical trail, forming a succession of sharp zig-zags, we reached the flat by four o'clock.

The rocks of this vicinity are chiefly very hard felsites, and porphyrites, of the Mesozoic volcanic series, tilted to a vertical attitude, and traversed by dykes of granite. The river is exceedingly rapid and turbulent, and is hemmed in by rugged cliffs, which, however, do not form a cañon of great depth. From the edges of the cliffs the mountains rise in rough slopes of greater or less inclination to a height of probably 3,000 feet.

Indian salmon fishery.

There are two Indian houses here, one on each side of the Salmon River, opposite a small waterfall, at which the natives make their annual fishery. A precarious bridge of poles and sticks is constructed across the torrent, and a series of baskets arranged along the front of the fall, into which, in trying to leap up, the salmon drop. Two Indians, who had attached themselves to us so far, appeared much disappointed at the height of the water and consequent absence of fish. They told me that long ago the bridge used to remain always, but now that the rock in the middle of the stream, on which it is partly founded, had become so much reduced in size, that the structure is washed away every winter.

Re-appearance of Douglas fir.

At the Salmon House the Douglas fir, which does not appear east of this over a considerable tract of country, is again seen as a large tree. There are a few modern Indian graves on the flats, and three small heaps of stones, probably also sepulchral, to which superstitious stories attach, and an offering of a twig is made by each passer-by.

July 11.—Took three photographs and then hurried back to the place where we had left the mules. Got them packed, and returned by the trail to the lower end of Tanyabunkut Lake. Here we found the tribe of Indians, waiting till a favorable report should be received from the Salmon House. I had learned by cross-questioning the Indians, that a trail, which was sometimes travelled, existed from this place to Na-coont-loon Lake, south of the Salmon River. This I was anxious to examine, but found it very difficult to procure a guide, partly from reluctance to hard work among the Indians, and partly also, I think, from the fact

Old trail to Na-coont-loon.

that few of them had been over the trail I wished to follow. By giving the chief a small present of tobacco, however, and after much talk, a man was finally induced to promise to go.

"Fire stone." *July* 12—Started on foot to examine a locality which I had learnt from the Indians yielded "fire stone." Followed the trail towards Bella Coola, crossing the Tai-a-taesli, where it leaves the lake, a stream twenty feet wide by two deep, with slow current; the Tsul-tel-a-ko, a stream of forty feet by two feet, with a slope of about one in ten, shortly after leaving camp; and the Ko-has-gan-ko, sixty feet wide by two feet deep, with a similar steep inclination. The two last named streams flow from the flanks of the Tsi-tsutl range, and are fed chiefly at this season by the melting snows, being much larger in the afternoon than in the morning, after the cold of the night. On the Ko-has-gan-ko, five miles from camp, the "fire-stone" was found, and proved to be lignite of good quality, which, with its associated rocks dips below the volcanic accumulations, forming the Tsi-tsutl Mountains.

July 13.—Set out with our Indian guide, following the trail walked over yesterday to the Ko-has-gan-ko, and continued southward beyond it for about six miles. The Indians had led us to expect a bad trail, which was quite borne out by the facts. We crossed one other considerable brook, ten feet wide by six deep, with rapid current, and continued ascending diagonally over the north-western flank of the range. Gravel mounds and ridges apparently morainic, and densely timbered, alternate with swamps, in which the mules were constantly miring. Camped near dark at a height of 3,700 feet in a notch holding a swamp with some grass, and separating a rocky knoll from the main slope of the Tsi-tsutl Mountain.

Fine view from Tsi-tsutl Mountain. From this knoll a magnificent view is obtained over the whole surrounding country. Westward, the serried and snow-clad peaks of the inner ranges of the Coast Mountains are seen across lower rounded hills, and the valley of the Tahyesco. Through these the hollow of the Salmon River valley was indicated by a blue haze, with which it was filled, while the river itself is entirely concealed by the high intervening land. Northward, a portion of Si-gut-lat Lake appears up the valley of the Iltasyouco, while very distant snowy mountains—probably the Quanchus Range—rise above the horizon in one place. Tanyabunkut Lake lies too deep to be seen, but the broad hollow by which the trail reaches it from the Salmon River crossing is apparent. From the south-east side of the lake the whole surface gradually rises toward the peaks of the Tsi-tsutl range, here and there, however, showing only broken remnants of a surface which has at one time been a continuous

slope of volcanic materials. At the western end of the range, nearest to the point of view, the basalt flows simulate terraces, in their flat tops and broken and abrupt fronts. One of the mules died this evening from accidental injuries received during the day's march.

Alpine meadows.

July 14.—Travelled almost directly southward, descending for about a mile and a-half, when a stream forty feet wide and six inches deep, flowing rapidly westward to the Tahyesco, is crossed. From this a gradual ascent is again made, and the trail then passes southward for some miles through a remarkably straight notch-like valley, separated by low hills from the Tahyesco on the west. A narrow grassy meadow follows the valley, and slopes northward and southward from its highest portion, the whole surface being saturated with moisture and indented with little hollows filled with clear water. The grasses and carices are at this date green and well grown, and very nutritious pasture could, no doubt, be obtained here during the summer months. After crossing two other streams—the first ten feet wide by six inches deep, with rapid current; the second, fifteen feet six inches, with slope of one in ten, reached the Tahyesco—and camped on its bank among burnt woods, at an elevation of about 3,690 feet, having made eleven miles in the day's march. The depth of the snow in the woods of this high region in winter must be very great, judging from the height at which branches have been broken down by it, and of the stumps of trees which have been cut at that season by the Indians. The line above which large patches of snow are seen during the summer months on this Tsi-tsutl Range is much lower than that on the Il-ga-chuz Range, to the east, of which the climatic circumstances must otherwise be much the same. A drenching thunderstorm this afternoon and steady rain in the evening.

Depth of snow in winter.

Upper part of Tahyesco.

July 15—After crossing a branch of the Tahyesco twenty feet wide by one foot deep, with rapid current, we travelled eastward near the main stream, which was estimated at thirty feet wide by one deep, ascending gradually into a quite alpine region over 4,000 feet above the sea level, and beyond the limit of thick forest growth. The valley of the branch of the Tahyesco here followed is sometimes a mile in width, and runs southward between two ranges of hills; that on the west being the higher, and showing through its gaps more elevated peaks of the Coast Range. About two miles from camp, the main stream of the Tahyesco enters the valley up which the trail passes, from the right, forming a fine waterfall. The trees, which still continue to grow in clumps where heavy drifts of hard snow encumber much of the surface, belong to three species :—*Pinus contorta*, *Pinus albicaulis*, and *Abies lasiocarpa*—all

Alpine plants.

more or less stunted. The first named thrives moderately well, but often forks upward, departing in this respect from its habit in the lower regions. The second is not so common; and the last appears to be most hardy, growing stout, and with many low wide branches sweeping the ground. The smaller plants are of quite arctic appearance, and are seen in many places springing up in successive crops along the retreating edges of the snow. A peculiar white *Caltha*, (*C. leptosepala*), a *Ranunculus* (*R. macranthus*) with *Kalmia glauca* (var. *microphylla*), and occasionally *Spiranthes* and *Ledum latifolium*, thrive; in warmer situations a species of heath-like *Menziesia* (*M. empetriformis*) with *Andromeda cupressina*, were abundant.

Bella Coola Valley.

The trail was here scarcely visible, but our Indian guide knowing the country, led confidently on, and brought us at length to the northern brink of the great gorge of the Bella Coola Valley. Here he stopped, and told us it was utterly impossible to descend into the Bella Coola Valley with animals, or to follow the trail along its bottom to Na-coont-loon as I had hoped to do. He had apparently mistaken my intention in coming this way, thinking I wished merely to see the Bella Coola Valley and return as we had come. This being the case, it was decided to return some miles down the Tahyesco, and then strike off directly toward Na-coont-loon south of the Tsi-tsutl Range, the Indians having before told me that the country there was practicable. We crossed the rocky ridge on the east side of the valley, travelling often for considerable distances over old snow banks, hard enough to support the mules, and in some places ruddy from the growth of *Protococcus nivalis*, and camped at an elevation of about 4,357 feet, near a small lake called Ta-ba-tas-kun by the Indians. About one-tenth of the surface was here covered with snow. A very remarkable peak, (Mackenzie's "stupendous mountain," p. 316) towers above the Bella Coola Valley on the southern side. Its Indian name is Chil-a-thlum-dinky.

Turn toward Na-coont-loon.

Si-ka-ta-pa Lake.

July 16.—Travelled eastward near the junction of igneous flows of the Tsi-tsutl Range, with the older underlying rocks, making nearly eleven miles in the day's march. A mile and a-half from our morning camp came to a small lake called Si-ka-ta-pa, where our guide hoped to find a trail leading to Na-coont-loon, and where the "saghalie" trail from Tanyabunkut descends the southern slope of the Tsi-tsutl Mountains, in its course to Bella Coola. This "saghalie" or mountain trail I had originally intended our guide to follow. It is evidently that by which Sir Alexander Mackenzie reached the Bella Coola Valley, and Si-ka-ta-pa is probably the lake he describes on p. 316 of his narrative, which was

passed by him eighty-four years ago, just one day later in the month of July than the date of our visit.

The country to the south of our route is broken, with rocky hills, and one remarkable snowy range, rising probably 700 feet above the general level, forms the northern brink of the Bella Coola Valley. To the north the surface rises in steps—marking the various basalt flows—to the higher peaks and broken remnants of plateaus, which form the summits of the Tsi-tsutl Range.

Character of country.

The country travelled over is lightly timbered with groves of the species mentioned yesterday, and though very stony in places, shows some grass on the slopes, and occasional fine meadows. Camped in a wide valley with flats covered with beautiful grass, through which the Tsed-a-kul-ko River (Cheddakulk of Palmer's Survey of the Bella Coola Valley) flows.

Streams flowing to Bella Coola

We nearly lost, in a stony torrent to-day, one of the pack mules, carrying camera and collection of plants besides part of food. The larger streams met with were as follows:—Branches of the Ne-ti-kun-as-ko:—torrent fifteen feet by two feet; stream fifteen feet by one foot; slope, one in twenty-five; main branch on issuing from Si-ka-ta-pa Lake, with the addition of the last named, thirty feet by five feet, torrent. Brook joining upper part of main stream, twelve feet by two feet; slope, one in ten; main stream, near its source, six feet by six inches, swift. Branches of the Tsed-a-kul-ko:—west branch (Tsan-tsal-ko), twenty-five feet by two feet, slope, one in twenty; main stream, forty feet by two feet, one in ten. All these streams are now full of water from the melting snows of the higher portions of the range.

Descend toward Na-coont-loon.

July 17.—Made about fourteen miles eastward, most of the way through open country like that before described, with many swamps and lakes of small size. On gradually descending from the south-eastern flank of the Tsi-tsutl Range, the timber becomes thicker. *Pinus contorta* and *Abies Engelmanni* preponderating, though at first rather scrubby. Swamps and meadows with much good grass still, however, occur abundantly. Camped on the bank of a large brook or small river called the Tus-ul-ko, here thirty feet by three feet, with gentle current, a tributary of the Salmon River, at an elevation of about 4,234 feet. Saw little snow to-day, even when travelling at a high altitude in the morning, a fact showing that the influence of the coast range in causing great precipitation diminishes very rapidly eastward. This we afterwards found still more markedly on the Il-ga-chuz Range, where the limit of sturdy growth of trees is considerably higher, and the vegetation

Causes of great snow-fall.

not so arctic. The immense snowfall on and immediately east of the Coast Range, by retarding the advance of summer, succeeds in reversing the effects which the vicinity of the sea might be expected to produce. It is also very probable, though no accurate observations have been made on this point, that the mountains about Dean Inlet, receiving the westerly and south-westerly winds from the Pacific, without the intermediation of any high islands, have in consequence a greater rain and snow fall than is usual even in this range. Our guide now confesses that he has not been in this region since he was a very little fellow, and the trail which we are supposed to be following is a very dim one, the appearances being that this part of the country has been almost abandoned by the Indians. Jim has a good eye for country, however, and seems almost by instinct to pick out the right way.

Na-coont-loon country.

July 18.—After travelling a few miles, struck the old Indian trail, which, though somewhat overgrown, saved us much trouble in chopping. Followed the valley of the Tus-ul-ko pretty closely till we reached the main Salmon River, a short distance above its junction with this stream, and at the lower end of A-bun-tlut, the most northern of the Na-coont-loon lakes. The country descends gradually toward the Salmon River, but appears nearly flat. The soil is generally sandy and gravelly, dry and poor; but swampy meadows, with good grass abound. Many moraine-like heaps and ridges, running east and west, occur. Rocks of the Tertiary volcanic series underlie the country. The Salmon River is here at an elevation of 3,440 feet, and flows north-westward in a wide valley, from which the gently sloping bases of the Tsi-tsutl and Il-ga-chuz Ranges rise, on the west and east sides respectively. Southward and south-eastward, the whole surface of the country appears low and flat, with a level sea-like horizon, but is probably at too great an elevation to render agriculture possible. Soon after our arrival two Indians, father and son, came into camp and informed us that several families were living for the summer at Na-coont-loon Lake. We had been previously told that all the Indians from this part of the country had moved down to the Chilcoten River, under the priests' directions.

Salmon River.

Na-coont-loon Lake.

July 19.—Bowman went south-eastward on foot, under the guidance of one of our new friends, to Na-coont-loon Lake. Beyond A-bun-tlut is a small lake called Nat-se-den-la, and at about seven miles from camp the Salmon River issues from the north end of Na-coont-loon Lake proper, which is a wide sheet of water, probably over five miles long, though the upper end, turning westward, was not seen.

July 20.—Ferried our stuff over the river on a raft, which we had

built yesterday, the mules crossing easily, without loosing bottom or miring. Made about eleven miles east-north-eastward, under the guidance of the elder of the Na-coont-loon Indians, who showed us a disused Indian trail, part of which was still in fair order, but which, in many places, was much encumbered with fallen timber, rendering long detours necessary. Camped at 5.30, having lost the trail, among windfall, and in a perfect storm of mosquitoes. We are now on the so-called Bella Coola Trail, which leads from the Bella Coola Valley, *via* Na-coont-loon, to Tse-tsi Lake, mentioned previously. On leaving the flats about Salmon River, it gradually ascends the long southern slope of the Il-ga-chuz Range, and eventually passes over its eastern flank.

Il-ga-chuz Range.

July 21—Recovered the trail this morning, bade adieu to our Na-coont-loon friend, and continued gradually ascending as we advanced, till after a few miles we found ourselves on a broken plateau, with only scattered clumps of trees, and on the upper parts nearly bare, resembling the high open country of the Tsi-tsutl Range. The surface is dotted with small ponds and lakelets, and many little streams filled with snow water are crossed. The vegetation is quite alpine, but more varied than on the Tsi-tsutl Mountains. The following additional species, among others, were collected, *Sedum Rhodiola*, *Aster salsuginosus*, *Pedicularis euphrasoides*, *Pedicularis Grœnlandica* var. *surrecta*, *Menziesia glandulifera*, *Dryas octopetala*, *Campanula lasiocarpa*, *Gentiana glauca*. Several caribou were seen during the day's march, this high country being their favourite summer haunt. Camped in a sheltered nook on the north-eastern angle of the Il-ga-chuz Mountains, at an elevation of 5,200 feet. Good feed for the animals; but though large snow banks all around, mosquitoes very troublesome. The higher peaks of the range, perfectly bare of vegetation, rise to the west. We were much tempted to stay a day and ascend them, but our provisions being low, and not knowing exactly how far we might have to go to reach the Y. Division of the Railway Survey, thought it hardly safe to do so. Even from this elevation, however, a very extensive view is obtained. Eastward the eye is carried over a continuation of the broad high-level plateau, which we have travelled on, to the base of the It-cha, the furthest east snowy volcanic range, which is seen from here to have originally had a broad dome-like form, such as volcanic materials falling into water might be expected to assume. Broken and flat-topped remnants of its uniform surface, now, however, only remain on the flanks, while the central region shows irregular shattered peaks, without a trace of the original form.

Vegetation of the range.

Extensive view.

The upland plateau surrounding the three volcanic ranges, and con-

necting together the two eastern, will some day be of value in affording alpine summer pasturage of the most nutritious kind. This may probably be available during at least three months, after which animals would require to be driven down to a lower level.

Terrace at 5,270 feet.

July 22—On leaving camp, found ourselves at about the general level of an extensive, though somewhat broken and denuded flat, which stretches along the northern flank of the Il-ga-chuz Range. The material of this terrace is rolled and water-worn, and while chiefly derived from the volcanic rocks of the vicinity, travelled fragments not represented among these, also occur. It evidently marks an old water line, probably of the sea, but is higher than I have ever before seen. (See Plate II.)

Descend to the Blackwater.

Travelled northward, finding the Indian trail again soon after starting. The country gradually slopes down to the lower levels, the woods at the same time becoming thicker, with great areas of *brulé* and wind-fall, with swamps in which the animals more than once mired down. Crossed first several small streams running north-eastward, and then a large one with a width of forty feet, depth of six inches, and slope of one in fifty, derived from the central portion of the range. After crossing this little river twice more, in its windings, we left it, and shortly afterwards came very unexpectedly to the main stream of the Blackwater, running *westward*, with a strong steady current, about forty-five feet wide, and average depth of two feet. Camped on its north bank, having travelled about thirteen miles. The Blackwater River here appears to come from a south-easterly direction, from the It-cha Range and plateau country between this and that from which we had descended, where its sources may be said to be.

Reach Tse-tsi Lake.

July 23—After making four and a-half miles north-eastward, through densely wooded country with small lakes, reached Tse-tsi Lake, and the main Blackwater and Salmon River Trail. Found a small cache of provisions, and a mail, left for us by Mr. C. Seymour on his way from Quesnel to the Salmon House with supplies.

Qualcho Lake.

Qualcho Lake and thence to Fraser Lake.—From this point we travelled westward again to Gatcho Lake by the trail which has already been described; and from that place, north-westward seven miles, by an Indian trail to Qualcho Lake, where we found Mr. Hunter, in charge of Y party of the C. P. R. Survey. Qualcho Lake discharges westward into Si-gut-lat Lake, is about five miles in length, with clear water and pebbly beach, chiefly composed of rocks of the Porphyrite series, many of them glaciated. The banks rise somewhat abruptly from the lake shore to heights of 100 to 150 feet, and the whole surrounding country is thickly

PLATE II.

PHOTO.LITH.BY THE BURLAND DESBARATS CO. MONTREAL.

From Photo. July 21st, 1876.

LOOKING ACROSS WORN TERRACE-FLAT AT ELEVATION OF 5,270 FEET, TOWARD HIGHER PEAKS OF IL-GA-CHUZ RANGE.

wooded, save where fires have passed, or the soil is too sandy and poor to support a rank growth.

Country about Qualcho and Gatcho Lakes.

Four miles east of Qualcho Lake, without intervening high country, the Gatcho Lake stream—already mentioned as the south-eastern source of the Nechacco in this direction—is found. The general elevation of the country in this vicinity is about 3,300 feet. It seems to be based on wide-spread, though somewhat irregular benches, forming plateaus differing a little in elevation. The stream-valleys are hollowed out in this, generally without reaching solid rock; and low mounds and ranges of hills project in some places above it. The material of the benches is sand, gravel, and small boulders, in various proportions, but chiefly derived from the Porphyrite series. The soil is almost invariably poor, and only occasional hay meadows are found. No marked features intervene between this region and the Coast Range, which bounds the view westward. On July 30, the fire-weed (*Epilobium angustifolium*) was beginning to flower, *Linnæa borealis* was in full flower, and wild strawberries were ripe, and in some places abundant.

Journey to Fort Fraser

From Y Division Camp on Gatcho Lake stream, I set out towards Fort Fraser, on August 7th, re-inforced by two axemen from Mr. Hunter's party, and some additional pack animals. It will be unnecessary to enter into the daily routine of this part of the summer's work; it will suffice to state, that after twenty-five days of severe labour in a country terribly encumbered by forest and wind-fall, we reached the Telegraph trail near Ta-chick Lake. A brief description of the route will, however, be given.

Gatcho stream.

Following near the Gatcho stream north-eastward twelve miles, Euti-a-kwe-ta-chick Lake, into which it flows, is reached. In the intervening distance, several small lakes and ponds, formed by expansions of the stream, are seen, and at the lower end of the longest of these—six miles from the lake above named—it is joined by a much larger stream, the estimated dimensions of which, on the 8th of August, were: width fifty feet, depth six inches, slope one in one hundred. The upper part of the valley of this brook, as far as it can be seen from the vicinity of its mouth, bears S. 44° E., and it must drain a wide area lying west of the south-eastern extension of the Toot-i-ai Mountains and the northern bank of the Uhl-ghak stream and Blackwater. The surface of the country still preserves an appearance much like that last described, the streams, however, as they are followed down, cutting more deeply into the plateau surface. The appearance of the vegetation leads to the belief that the rainfall of the region is inconsiderable; and where the soil is poor, and fire has removed the covering of scrub pines, it often scarcely tends to

reclothe itself. In the river valleys, however, and along some of the lakes and ponds, very beautiful meadows of natural grasses appear, of which, the area, though quite small when compared with the whole country, must in the aggregate be considerable. In sheltered valleys, and on the southern slopes of the lakes, Engelmann's spruce is found attaining a fair size. The Douglas fir does not occur.

Eu-ti-a-kwe-ta-chick Lake.

Eu-ti-a-kwe-ta-chick Lake, eight miles in length, and averaging about half a-mile in width, lying north-east and south-west, is a fine sheet of water. The banks are bold, the country attaining its full height of 150 to 200 feet near the lake. The north-western side is somewhat lower and more broken than the south-eastern, which is the more heavily timbered. At the lower end of the lake, the valley is continued by a flat marshy strip of country of equal width with the lake, and not much above its level. Through this, the issuing stream, now called the Kes-la-chick, pursues a very winding course for three miles, when low banks of gravel and drift-material appear, and making a right angle, it turns abruptly to the left into a narrow rocky chasm, with walls nearly 300 feet high. A short distance further on the stream again returns to the main valley. The diversion appears to have been caused by a barrier of drift accumulated during the glacial period, which must have been much higher and more complete at the time the change first took place.

Kes-la-chick River.

From this point to Na-tal-kuz Lake, the river, though flowing on the whole in a direct north-eastward course, is very tortuous in many places in detail. The sides of its valley become steep, and on approaching the high country surrounding the base of Toot-i-ai Mountain become absolutely perpendicular and cañon-like in places, and from one hundred to nearly 200 feet in height. There is generally a little flat ground a few feet above the water level, but the stream running at intervals into the foot of the steep banks renders it necessary to cross and recross in the endeavour to follow it. The largest stream observed to join the river in this part of its course, was fifteen feet wide by six inches deep, with a slope of about one in twenty. Before entering Na-tal-kuz Lake the river has a breadth of about fifty feet, with an average depth of two feet where it runs rapidly. The plateau above the river valley is densely timbered, though generally with small trees, and scarcely affords any pasturage. The soil throughout is poor, sandy or stony, and quite unfit for agriculture, even if at a much lower level.

Toot-i-ai or Fawnie's Mountain.

Toot-i-ai, Toodeeney, or Fawnie's Mountain, near the north-western base of which the Kes-la-chick passes, is the most prominent peak in this part of the country. It has already been referred to as being on the

PHOTO LITH. BY THE BURLAND DESBARATS CO. MONTREAL.

From Photo. Aug. 18th, 1876.

TOOT-I-AI OR FAWNIE'S MT. FROM HILLS NEAR EAST END NA-TAL-KUZ LAKE.

continuation of the mountainous belt of Kuy-â-kuz Lake. Its summit must be about 6,000 feet above the sea, and is quite remarkable from its symmetrical form. Seen from all points of view its outline is much the same,—a broad sloping base, like an overturned basin, with a small roughly conical peak in its centre. It is detached nearly to its base on all sides, and only approached by mountains of lower height on the south-east. Seen from the north-east, the central peak shows three distinct, though somewhat irregular horizontal lines, while lower down on the flanks are step-like prominences showing against the sky, and dim lines across its front; all suspiciously like old water marks, represented either by the remnants of gravel benches or by erosion of the rocks. In the gap immediately east of Toot-i-ai, distinct flat-topped terraces are seen at an elevation estimated as 800 feet above Na-tal-kuz Lake, or 3,460 feet above the sea. (See Plate III.)

Na-tal-kuz Lake

Na-tal-kuz Lake, lying north of Toot-i-ai Mountain, is Y-shaped, the two branches running westward, while the stem narrows to the place at which the main Nechacco River flows out, and points directly eastward. The distance from the eastern end to the head of the southern branch is nearly six miles, and from the same place to the head of the northern, eleven miles (by Mr. Cambie's survey). The extreme width, measured just before the divergence of the branches, is about two and a-half miles. The southern arm receives the drainage of Tetachuck Lake and the Kes-la-chick River, while the northern is continued by a great series of lakes and rivers, surveyed by Mr. Cambie after the time of my visit. From a prominent rocky hill, about 300 feet above the general level, a good view of the lake and its surroundings was obtained, and a topographical sketch made. The south side of the lake and of its south arm, rises pretty steeply to a height of 100 to 200 feet, and the surface then only slightly gains in elevation as it runs back toward Toot-i-ai. Some meadows and hill sides with fair grass occur, but the greater part of this bank is densely timbered with tall straight trees of scrub-pine, birch, and poplar. The valley of the south arm is continued westward by low country, and through it, at a great distance, the mountains of the Coast Range are visible. The point between the north and south arms slopes also rather steeply from the water to a flat or slightly rounded summit. Beyond it, blue hills at a distance of twenty to thirty miles close the view. The valley of the north arm turns northward, and from this point of view appears closed by a rather remarkable square-topped mountain, which must rise more than 1,000 feet above the water level. The north bank of the lake, east of the point of union of the two arms,

View of Coast Range.

rises rather abruptly, at first in well marked terraces to a height of probably 200 feet, and then in irregular undulations to the summits of a range of hills, which appears to attain a height of 800 to 1,000 feet above the lake, at a distance of a mile or two from it. Somewhat east of these, and beyond them, another and higher range is seen, at a distance of eight or ten miles. To the north-east, the low distant mountains of the Telegraph Range appear, with the valley of the Nechacco running towards them. The eastern edge of the Toot-i-ai Mountains is rather indefinite, sloping gradually down towards low country.

Nechacco River.

The Nechacco, where it issues from the eastern end of Na-tal-kuz Lake, is a noble stream, nearly 200 feet wide, deep, with strong steady current, and filled with clear blue water. The lake is pretty evidently dammed by moraine matter, through which the river has since cut its way. The moraines are more perfectly preserved here than I have elsewhere seen them, forming long sharp-topped and slightly sinuous ridges, which sweep round in broad curves, nearly parallel to the river valley for some miles. They are separated by narrow, deep, V-shaped valleys, and are probably in some instances over 200 feet in height. The slopes of these peculiar ridges are covered with bunch grass, and occasionally with sage, (*Artemisia frigida*), while in many places service berries abound, and were found quite ripe on the 18th of August.

Well-preserved moraines.

Ched-a-kuz-ko.

About four miles beyond the outlet of Na-tal-kuz Lake, the river receives an important affluent from the south. This stream is called by the Indians Ched-a-kuz-ko, and carries the waters of Kuy-a-kuz and Ta-tel-kuz Lakes, mentioned in a former connection. On August 18th it was estimated to be forty feet wide, by about eight inches deep, with a rapid current. Its valley near the Nechacco is wide and flat-bottomed, with pretty meadows through which it pursues a tortuous course. From a knoll in the vicinity it can be seen to continue as a wide depression for at least eight miles, with a bearing of S. 19° E.

Character of the country.

East of the Ched-a-kuz-ko the morainic character of the superficial deposits is not nearly so well marked, the ridges showing a tendency to become flat-topped, and eventually blending with broad sandy flats, at a small elevation above the river, which are covered sparcely with pine trees. From this point to its first great bend—eleven miles—the Nechacco flows in broad curves, in a wide valley, with broad flats on alternate sides. The current, as far as could be seen from our trail, appears throughout steady, and the water deep. The higher slopes of the valley and country beyond continue densely wooded, with few prairie patches even on the northern bank. Terraces are in some places

well developed, in many instances at elevations of 200 to 300 feet above the river. A large stream twenty-five feet by six inches, slope one in 200, enters the river at its angle, flowing from the east. Up its valley, at a distance of three or four miles, is a remarkable step-shaped mountain, which can be seen from Na-tal-kuz Lake. It forms a portion of the broken country of the western ridges of the Telegraph Range, which running athwart the course of the Nechacco at this place, with a nearly north and south direction, causes it to double back on itself.

Nechacco canon.

Beyond the first great bend, the river becomes swifter and more contracted, with rapids at intervals, the sound of some of which was heard while travelling through the thickly wooded country above. Six miles lower, where the bank was again approached, the stream was found plunging onward over rocks and between small rocky islands, with cliffs about 100 feet high at its sides. These are composed of thick beds of basaltic and other igneous rocks, inclined at low angles, and underlaid by softer Tertiary beds near the water line. A terrace still continues to appear at a height of about 200 feet above the water. (See Plate IV.)

The windfall in this part of the river valley became so impenetrable that we were obliged to leave it and strike north-eastward across the plateau above, which was found to be not much better. A north and south valley here runs some miles east of that of the main stream, bearing much the same relation to it as the string to a bow, and holding a small stream, with wide marshy beaver-meadows and remains of beaver dams. This runs northward, and has been followed at one time by an Indian trail, of which traces remain, but which has evidently been abandoned for a long time. The surface of the plateau is broken and rugged, with small outlying hills of basaltic rocks. There is, however, good feed for animals along the creek, though the general surface of the plateau offers little grazing even in the swamps, and is quite unfit for agriculture. I subsequently wrote to Mr. Hunter, mentioning the existence of the valley of this stream, which was named Cut-off Brook, and suggesting it as a possible means of avoiding the bend and bad work on this part of the Nechacco, in the railway line. It was, I believe, afterwards surveyed.

Benches of white silt.

Beyond the mouth of Cut-off Brook, the Nechacco valley continues for about eight miles in a north-eastward course in a moderately broad valley, with benches at 200 to 300 feet above the water level. These are now found to be composed of fine greyish arenaceous clay, pretty hard when dry, but evidently subject to extensive slides during the wet season. It is an extension of the white silt deposit, afterwards found so largely

developed in the basin of the lower Nechacco. With the change in the appearance of the surface material, the soil becomes much more fertile and supports heavy timber. On the lower benches, Engelmann's spruce frequently surpasses three feet in diameter, and the aspen attains a diameter of two feet and grows tall and straight. Occasional large cottonwoods (*Populus balsamifera*) also occur, and clusters of well grown and tall birches. The alder and high-bush cranberry abound as an undergrowth. On the higher terraces, spruce and aspen characterize the damper and more sheltered localities, while elsewhere, the scrub pine, tall and straight, forms the forest.

Second great bend of Nechacco.

The river from this point, making a second considerable bend, turns almost directly northward. At its angle it is joined by a brook about twenty feet wide by nine inches deep, with a rapid current through the valley of which the railway location line was carried. The Nechacco then, for about five miles, flows through a broken hilly region, forming a spur of the Telegraph Range, in a deep, heavily wooded valley with steep sides. The hill slopes have been in many places thoroughly burnt over, and are now partly open and covered with wild pea and vetch, raspberry bushes and a varied herbaceous growth. The river is bordered by clay, sand, and gravel bluffs.

On emerging from the hilly country, the Nechacco continues northward to the vicinity of Fraser Lake in a low, level region, which for the most part appears to be thickly timbered along the borders. According to Mr. Bowman, who examined this part of the river by canoe, its current is uniform and tranquil, with the exception of two small rapids, each of which was estimated to equal a descent of about two feet. The banks show frequent exposures of the white silts.

Reach Ta-chick Lake.

Leaving the river with our trail, while still involved in the hilly country, we steered north-eastward in the direction in which Ta-chick Lake was believed to be, and reached the Telegraph Trail on its south-eastern border on the 31st August, short of provisions, and with the pack animals nearly useless from the privations through which they had gone. The country intervening between the nearest part of Ta-chick Lake and the Nechacco River, to the west, is low, but slopes gradually up to the south. It has been for the most part pretty well cleared of heavy timber by fire, but still shows occasional patches of bad windfall. The higher ground is rather light and sandy, and forms undulating ridges; but on approaching the lake it became nearly level, and slopes gently down to the fertile land bordering it.

The country in the vicinity of Ta-chick and Nool-ki Lakes, stretching

PHOTO-LITH. BY THE BURLAND DESBARATS CO. MONTREAL.

From Photo. Aug. 22nd, 1876.

RAPID ON UPPER NECHACCO, SOUTH OF FORT FRASER.

(Tertiary Igneous and Sedimentary Rocks.)

Appearance of country about Ta-chick Lake.

westward to Frazer Lake and eastward down the Nechacco, is generally level, or but gently undulating, and more fertile in appearance than any land before seen on the line of route followed. It is based on the very fertile white silts of the Lower Nechacco basin, with only occasional low ridges with gravel and boulders, which may belong to the underlying boulder-clay. Open groves and scattered park-like clumps of aspen poplars, with occasional areas of thicker woods, formed of scrub pine, alternate with meadows and open land, which is covered with a fine growth of natural grasses, wild pea and vetch. (See Plate V.) The slopes bear thickets of the service berry (*Amalanchier Canadensis*), which were covered with fine fruit in great profusion. On our way to Fort Fraser by the old Telegraph Trail, we found numerous families of Indians at work harvesting the berries, which we were told were more than usually abundant this year. They were fully ripe at the end of August. Near Fort Fraser, the choke-cherry (*Prunus Virginiana*) appears in some places on sunny northern banks, with the service berry; and it may here be mentioned that it was also found in similar localities on François Lake, and near Fort St. James on Stuart Lake.

Arrangements for expedition to François Lake.

On arriving at Fort Fraser I found myself, owing to the time occupied in the difficult country between Gatcho Lake and that point, too late to keep my appointment with Mr. Cambie, who had left some days before. Through the kindness of Mr. Alexander, in charge of the Hudson Bay Post, I was able, however, to obtain a re-supply of the more necessary provisions—there being, fortunately, sufficient flour and tea in the store—the loan of a fish-net, and a suitable dug-out canoe, with two Indians. Hiring an Indian boy to assist the packer, I sent him back for supplies to Blackwater Depot with such of the animals as were fit to travel, while we set out by water to examine Fraser and François Lakes in which, fourteen days were occupied. A general description of these lakes and the country in their vicinity will be given.

Valley of François and Fraser Lakes.

Broadly viewed, François and Fraser Lakes occupy the western portion of a depression, nearly coinciding with the fifty-fourth parallel of latitude. The upper part of the Nechacco—which we had followed in our former journey—reaching this depression from the south, immediately adopts it as its course, and receiving at its angle the stream from the two great lakes, flows almost directly eastward to the Fraser River at Fort George. The original cause, or mode of formation of this depression, I have not been able to determine, but it is paralleled by others of a similar character making important features in the topography of the country.

Fraser Lake (Nau-tley of the Indians) is about twelve miles in

Fraser Lake.

length, shallow at both ends, but apparently deep in its central portion. Its elevation is about 2,225 feet. It discharges eastward, over low ground forming a continuation of the trough in which it lies, on a part of which Fort Fraser is situated. The country about its west end is also low, and in part swampy. Near Fort Fraser, is the Indian village of Naul-tey, and at the other end that of Stella: each inhabited by a few families, the remnants of a once more numerous tribe, who appear to live in comparative comfort, and cultivate small garden patches, but are neither industrious nor cleanly.

The lake is bordered to the north and south by rather bold and broken hills, some of which, probably, rise from 600 to 800 feet above it, and are of Tertiary volcanic rocks. There are, however, in some places, patches of flat terrace country of considerable size, suitable for agriculture, where the bays of a former larger lake have been filled with sediment.

Terraces.

Benches are distinguishable on the higher slopes to a height estimated at over 200 feet above the lake, or 2,450 feet above the sea. The hills on the north side show a general tendency to form ranges, which run from the lake in a north-westward direction, with steep bluffy fronts south-westward, and longer slopes to the north-east.

The Douglas fir again appears in some abundance on the hills about Fraser Lake, though not observed in any part of the upper Nechacco country.

Stellako River

The Stellako River, uniting François and Fraser Lakes, is wide and still at its mouth, on the south side of which the Indian village lies. On its north side it is joined by a stream called the En-da-ko, coming from a direction a little north of west, and navigable for canoes, one day's journey, to a lake which is described as not being very large. The Stellako soon becomes more rapid when followed up, and for the greater part of its course may be described as a succession of rapids, difficult for canoes, in consequence of their shallowness and the number of boulders and stones with which they are encumbered. In one place a fall of nearly five feet occurs, rendering a portage unavoidable, and in several other rapids it is necessary at most stages of water to lighten canoes before tracking them up.

The working time occupied in ascending by this river from Fraser to François Lake was ten hours twenty-five minutes. It is very tortuous, but in a straight line the distance is not more than six miles. The river is bordered in some places by terraces of rolled gravel and coarse sand, which from their number and arrangement show that it must have cut down by degrees to its present level. Granite cliffs, forty to fifty feet